

**REQUEST TO AMEND THE
DELTA ENERGY CENTER PROJECT
(98-AFC-3C)
AMENDMENT REQUEST #6**

AMENDMENT REQUEST

On March 12, 2003, Delta Energy Center, LLC (DEC, LLC) filed a request to amend several Air Quality (AQ) Conditions of Certification for the Delta Energy Center Project (DEC) to allow elevated nitrogen oxides (NO_x) and carbon monoxide (CO) emissions during steam turbine cold start-up and gas turbine combustor tuning periods. Specifically, DEC, LLC requests the following modifications:

1. Add new definitions for steam turbine cold start-up and gas turbine combustor tuning periods (Definitions);
2. Insert new definitions for steam turbine cold start-up and gas turbine combustor tuning period to AQ-27, 28, 48, and 49 to ensure that the facility daily and annual emission limits remain unchanged;
3. Insert new definitions for steam turbine cold start-up and gas turbine combustor tuning periods to AQ-29 to ensure the sequential start-up of the facility;
4. Increase the nitrogen oxides (NO_x) emission limit from 240 to 300 lbs/event during steam turbine cold start-ups and gas turbine combustor tuning periods (AQ-28);
5. Increase the carbon monoxide (CO) emission limit from 2,514 to 9,750 lbs/event during steam turbine cold start-ups and gas turbine combustor tuning periods (AQ-28);
6. Increase the precursor organic compound (POC) emission limit from 48 to 96 lbs/event that would apply during steam turbine cold start-ups and gas turbine combustor tuning periods (AQ-28),
7. insert language for steam turbine cold start-up and gas turbine combustor tuning periods to AQ-51 and AQ-52 to ensure accurate reporting of the facility emissions;
8. Insert new definitions for steam turbine cold start-up and gas turbine combustor tuning periods to AQ-61 requirements;
9. Add new condition AQ-79 to limit the number of hours of steam turbine cold start-ups and gas turbine combustor tuning periods per calendar year (staff combined this condition with AQ-29); and
10. Add new condition AQ-80 to record and report the number of hours the gas turbines operated in steam turbine cold start-up and gas turbine combustor tuning activities.

DEC, LLC states in their petition that the permitted facility daily and annual emission limits for NO_x, POC, and CO will be maintained and has not proposed any additional mitigation.

BACKGROUND

DEC was licensed with three Westinghouse 501 F gas turbine and heat recovery steam generator (HRSG) packages, two auxiliary boilers, a cooling tower and various support equipment. The facility has previously applied and gotten approval for five amendments, including the removal of the auxiliary boiler, increasing the size of the cooling tower, and reducing the facility's overall annual emissions. The DEC facility began operation in the spring of 2002.

Staff's objectives in completing the air quality analysis for this amendment request are (1) to identify whether there is a potential for a significant air quality impact; and (2) to assure that appropriate mitigation measures have been applied to avoid or mitigate the identified potential air quality impacts.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

STATE

California State Health and Safety Code, section 41700, requires that: "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property."

LOCAL

Bay Area Air Quality Management District (District)

The project's modification is subject to the specific District rules and regulations that are briefly described below:

Rule 1 - General Requirements. This rule contains general requirements, definitions, and a requirement that an applicant submits an application for an authority to construct and permit to operate.

Rule 2 - New Source Review. This rule applies to all new and modified sources.

STAFF ANALYSIS

Since its initial start-up and operation, DEC has frequently exceeded the approved start-up and shut down NOx and CO emission limits. Each time the limits are exceeded, DEC, LLC must apply for a variance with the District. To avoid future variances, the District staff suggested that DEC, LLC apply for a modification to the DEC Permit to Operate to increase the duration of steam turbine cold start-ups (up to 6 hours), and increase the turbines' NOx, POC and CO start-up and shut down emission limits.

In addition, DEC, LLC learned that the gas turbines' combustors require periodic replacement, which necessitates a tuning process (prolonged periods of low load operation), resulting in excess emissions of NOx, POC and CO.

DEC, LLC requested that during steam turbine cold start-ups, and gas turbine combustor tuning activities the emission limits for NOx increase from 240 lbs/hr to 300 lbs/hr, 48 lbs/hr to 96 lbs/hr for POC , and 2,514 lbs/hr to 9,750 lbs/hr for CO.

Because the facility's daily and annual emissions will not change, no long-term air quality impacts are expected. Since steam turbine cold start-ups and gas turbine combustor tuning events are expected to increase the NOx, POC and CO emissions limits, short-term (one-hour) impacts for NOx and CO need to be evaluated. POC's do not have any ambient air quality standards, so they are not modeled for direct impacts.

DEC, LLC has provided an analysis using an air quality model (ISCST3), approved by the District and the U.S. EPA to assess the impacts due to the short-term increase of NOx and CO emissions during steam turbine cold start-ups and gas turbine combustor tuning periods. The results of the modeling analysis are summarized in AIR QUALITY Table 1. The modeling results shows that the project's new NOx and CO impacts will not cause or contribute to any violations of the state and federal air quality standards for NOx and CO. Therefore, the project short-term NOx and CO emission impacts due to the modification of the facility permit conditions are not significant.

AIR QUALITY Table 1
Facility Emission Impacts

Pollutants	Avg. Period	Impacts($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Total Impacts ($\mu\text{g}/\text{m}^3$)	California Standard ($\mu\text{g}/\text{m}^3$)	Percent of Standard
NO ₂	1-hour	130	164	294	470	63
CO	1-hour	4,248	9,750	13,998	23,000	61

Notes: All ambient air quality impacts have been modeled as the impacts caused by emissions during start-ups.

Source: DEC March 12, 2003 Amendment Request.

RESPONSE TO PUBLIC COMMENTS

Californians for Renewable Energy (CARE)

Comment: Since the project has admittedly exceeded CO permit levels, the intent of the Decision for installation of the CO Catalyst should be required.

Staff response: A CO oxidation catalyst works well during normal operation when the exhaust temperature is high. During start-up, when the temperature is low and gradually increases, the CO catalyst would not help to minimize the turbine CO emissions. Because the facility's frequent exceedances of emissions for NOx and CO was during start-up episodes, staff believes that it is not necessary to require the installation of a CO oxidation catalyst.

CONCLUSIONS AND RECOMMENDATIONS

The request to increase the NO_x, CO, and POC emission limits during steam turbine cold start-ups and gas turbine combustor tuning activities will result in no significant direct impacts to the environment. The proposed amendment does not increase facility daily or annual emissions, so no additional mitigation is required or needed.

Staff recommends the approval of the DEC, LLC amendment request and notes that the District has already approved such changes. Specifically, staff recommends the revisions to the Definitions Section of the Air Quality (AQ) Conditions of Certification and to AQ-27, AQ-28, AQ-29 (incorporating DEC, LLC's proposed AQ-79 and AQ-80), AQ-48, AQ-49, AQ-51, AQ-52, and AQ-61. The revised Conditions of Certification are shown below in underline and strike out format. Underline indicates new language, while strike out indicates deleted language.

REVISED DEFINITIONS SECTION OF THE AIR QUALITY CONDITIONS OF CERTIFICATION

Definitions: Add the following definitions to the Definitions Section

Steam Turbine Cold Start-up Period: The lesser of the first 360 minutes of continuous fuel flow to the gas turbine after fuel flow is initiated or the period of time from gas turbine fuel flow initiation until the gas turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 27(b) and 27(d), following a steam turbine shut down of at least 72 hours.

Combustor Tuning Activities: Any testing, adjustment, tuning, and calibration activities recommended by the gas turbine manufacturer to insure safe and reliable steady state operation of the gas turbines following replacement of the combustor components, during seasonal tuning events, when recommended by the turbine manufacturer, or as necessary to maintain low emissions performance. This includes, but is not limited to, adjusting the amount of fuel distributed between the combustion turbine's staged fuel systems to simultaneously minimize NO_x and CO production while minimizing combustor dynamics and ensuring combustor stability.

Combustor Tuning Period: The period, not to exceed 360 minutes, during which combustor tuning activities are taking place.

REVISED CONDITIONS OF CERTIFICATION:

AQ-27 The owner/operator shall ensure that the Gas Turbines (S-1, S-3 & S-5) and HRSGs (S-2, S-4, & S-6) shall comply with requirements (a) through (h) under all operating scenarios, including duct burner firing mode and steam injection power augmentation mode. Requirements (a) through (h) do not apply during a gas turbine start-up or shutdown, a steam turbine cold start-up, or a gas turbine combustor tuning period. (BACT, PSD, and Toxic Risk Management Policy)

All other parts of this condition of certification remain unchanged.

AQ-28 The owner/operator shall ensure that the regulated air pollutant mass emission rates from each of the Gas Turbines (S-1, S-3 and S-5) during a start-up or a shutdown, or during a combustor tuning period do not exceed the limits established below. (PSD)

	Start-Up	<u>Steam Turbine Cold Start-up or Combustor Tuning Periods</u>	Shutdown
	(lb./start-up)	(lb./period)	(lb./shutdown)
Oxides of Nitrogen (as NO ₂)	240	<u>300</u>	80
Carbon Monoxide (CO)	2,514	<u>9,750</u>	902
Precursor Organic Compounds (as CH ₄)	48	<u>96</u>	16

All other parts of this condition of certification remain unchanged.

AQ-29 The owner/operator shall ensure that no more than one of the Gas Turbines (S-1, S-3, & S-5) shall be in start-up mode, supporting a steam turbine cold start-up or undergoing combustor tuning at any one time. (PSD)

The total number of hours during which the gas turbines (S-1, S-3, & S-5) may be operated to support a steam turbine cold start-up or may undergo combustor tuning shall not exceed 30 hours per year per gas turbine.

Verification: ~~In the annual/semiannual report the owner/operator shall indicate how this condition is being implemented~~ The project owner shall report the date, time and duration of each steam turbine cold start-up or combustor tuning event during the year in the Annual and Semiannual Air Quality Reports.

AQ-48 The owner/operator shall ensure that the total combined emissions from the Gas Turbines and HRSGs (S-1, S-2, S-3, S-4, S-5 and S-6), including emissions generated during Gas Turbine start-ups and shutdowns, steam turbine cold start-ups and combustor tuning activities do not exceed the following limits during any calendar day:

All other parts of this condition of certification remain unchanged.

AQ-49 The owner/operator shall ensure that the cumulative combined emissions from the Gas Turbines and HRSGs (S-1, S-2, S-3, S-4, S-5, and S-6), including emissions generated during gas turbine start-ups and shutdowns, steam turbine cold start-ups and combustor tuning activities shall not exceed the following limits during any consecutive twelve-month period:

All other parts of this condition of certification remain unchanged.

AQ-51 The owner/operator shall demonstrate compliance with conditions 20 through 23, 27(a) through 27(d), 28, 29, 32 through 34, 37(a) through 37(d), 46, 47, 48(a), 48(b), 49(a) and 49(b) by using properly operated and maintained continuous monitors (during all hours of operation including equipment start-up and shutdown and combustor tuning periods) for all of the following parameters:

All other parts of this condition of certification remain unchanged.

AQ-52 To demonstrate compliance with conditions 27(f), 27(g), 27(h), 28, 48(c) through 48(e), and 49(c) through 49(e), the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter (PM₁₀) mass emissions (including condensable particulate matter), and Sulfur Dioxide (SO₂) mass emissions from each power train. The owner/operator shall use the actual Heat Input Rates calculated pursuant to condition 39, actual Gas Turbine Start-up Times, actual Gas Turbine Shutdown Times, actual steam turbine cold start-up times, actual gas turbine combustor tuning times and CEC and District-approved emission factors to calculate these emissions. The calculated emissions shall be presented as follows:

All other parts of this condition of certification remain unchanged.

AQ-61 The owner/operator of the DEC shall maintain all records and reports on site for a minimum of 5 years. These records shall include but are not limited to: continuous monitoring records (firing hours, fuel flows, emission rates, monitor excesses, breakdowns, etc.), source test and analytical records, natural gas sulfur content analysis results, emission calculation records, records of steam turbine cold start-up and gas turbine combustor tuning activities, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Regulation 2-6-501)

Verification: During site inspection, the owner/operator shall make all records and reports available to the District, ARB, EPA or CEC staff.